



RESEARCH NOTE LS-69

LAKE STATES FOREST EXPERIMENT STATION • U. S. DEPARTMENT OF AGRICULTURE

Yellow and Paper Birch Seeds Germinate Well After 4 Years' Storage

Little is known about the longevity of birch seeds, which are actually winged nutlets. Only a few studies have considered the storage life of yellow birch (*Betula alleghaniensis* Britt.) and paper birch (*B. papyrifera* Marsh.) seed. Storage at room temperature for 1 year resulted in decreased seed viability in both species.¹ After 18 months yellow birch seed lost all viability, while that of paper birch still germinated well.² However, most tree seed will retain its viability longer if it is stored at low temperatures. Redmond and Robinson reported that yellow birch seed stored at 32° F. remained viable after 27 months,³ and storage of a single lot of yellow birch seed at 40° F. for 12 years resulted in 44 percent germination (original germination unknown).² The following results show that yellow and paper birch seed can be stored for at least 4 years without loss of viability.

Twelve seed lots each of yellow and paper birch were collected in the fall of 1960, dried at room temperature for a week or more, and stored in tightly closed bottles at 36° to 40° F. The germination of most lots was tested during December 1960 and January 1961. One hundred unstratified seeds from each lot were placed on moist Perlite in petri dishes and maintained in a greenhouse at about 70° F. for 30 days — the normal period used for birch germination tests. The second series of tests was performed during November 1964, four years after the seed was placed in storage. In 1964 the natural daylength was extended with fluorescent and incandescent light to 20 hours. Other test conditions were the same as before.

In 1961 germination of the yellow birch seed lots ranged from 5 to 84 percent with an average of 39.3 percent (table 1). Seed from only half of the trees germinated satisfactorily (30 percent or higher). In 1964 germination of the same lots ranged from 16 to 98 percent and averaged 60.6 percent, while seed from only two trees had less than 30 percent germination. Two seed lots (1899-5 and 1900-5) remained essentially unchanged, but seed of the other 10 trees had better germination than in 1961.

The nine paper birch seed lots tested in 1961 ranged from 1 to 58 percent germination and averaged 36.6 percent. Two of these lots (1903-1 and 1904) germinated very poorly, 1 and 6 percent respectively. After 4 years of storage, germination percentages for these nine lots ranged from 42 to 99 and averaged 78.4 percent. All lots of paper birch seed thus germinated better after storage than when fresh. The increase in germination varied with individual seed lots and was often substantial. The three previously untested lots all had very good germination in 1964.

The fact that none of these seed lots decreased, and most increased, in viability during the 4 years of storage is of biological significance and of practical importance to growers of birch planting stock. No definite reason for the increased germination was discovered, but the following circumstances may have had some effect. Seed of paper birch tree no. 1903-1 showed the largest increase in germination — from 1 to 86 percent. The seed was collected earlier from this tree than from the five other trees in the same stand and may not have been fully ripe at the time of collection. The storage allowed time for after-ripening of the seed and could have provided proper conditions for overcoming any embryo dormancy present in the seed. This could conceivably account for some of the increased viability of other lots as well. The long-day treatment the seed lots received in 1964,

¹ Joseph, H. C. Germination and vitality of birch seeds. *Bot. Gaz.* 87: 127-151. 1929.

² U. S. Forest Service. Woody-plant seed manual. U. S. Dept. Agr. Misc. Pub. 654, 416 pp., illus., 1948.

³ Redmond, D. R., and Robinson, R. C. Viability and germination in yellow birch. *Forestry Chron.* 30: 79-87. 1954.

TABLE 1. — Germination percentage after 30 days; yellow and paper birch seed collected in 1960

Yellow birch			Paper birch		
Tree number	Germination percent		Tree number	Germination percent	
	Jan. 1961	Nov. 1964		Jan. 1961	Nov. 1964
1899-1	21	33	1802-S ¹	58	79
1899-2	5	16	1802-N ¹	..	83
1899-3	15	46	1903-1	1	86
1899-4	10	55	1903-2	53	87
1899-5	84	87	1903-3	46	81
1900-1	70	81	1903-4	57	85
1900-2	81	98	1903-5	31	42
1900-3	61	72	1903-6	29	69
1900-4	49	85	1904	6	78
1900-5	24	26	1905	48	99
1900-6	21	63	1946-G ²	..	76
1900-7	31	65	1946-T ²	..	76
Average	39.3	60.6	Average	36.6	78.4 ³

¹ Seed from two separate stems of same tree.

² Lot G collected from ground, lot T from tree itself.

³ Averages of the 9 trees tested in 1961 and of all 12 trees are identical.

but not in 1961, could also have increased the germination percentages, since long photoperiods are known to promote germination of unstratified birch seeds.⁴

⁴ Vaartaja, O. Photoperiodic response in germination of four species of *Betula*. Can. Dept. Agr., Forest Biol. Div., Bi-monthly Progr. Rpt. 15(3): 2. 1959.

How much longer these seed lots will maintain their viability is unknown, but on the basis of these tests it appears safe to keep seed of yellow and paper birch for at least 4 years, provided the seed is stored in tightly closed containers at temperatures of 36° to 40° F.